Chapter 43
Using Epistemic Game Development to Teach Software Development Skills

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ABSTRACT

This paper presents a pilot study on the evaluation of instruments for data gathering for an epistemic game development competition for high school students. The initial results show that a significant percentage of the students who participated in the competition appear to exhibit a skillset of professional attitude, software-related knowledge, and employability traits, and this skillset may be attributed to the intervention. The data was validated through a two-method triangulation technique that utilized expert evaluation and participant interviews. The data analysis shows early indicators of the desired learning outcomes, although a more thorough methodology is needed to verify this. Furthermore, the competition acts as an awareness campaign that promotes computer science studies through a gamification process. It is proposed that competitions of this type are held and evaluated on an annual basis to maximize the benefits and to further prepare students to acquire early in their studies a skillset that will make them the innovators of the future society.

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1. INTRODUCTION

The Computer Science industry faces two major challenges among others: First, due to the fact that computers became ubiquitous (new types of software and hardware are progressively used not only within work environments but also for personal purposes) the industry is expanding, and an increasing number of professionals are required to work in the field. Second, as the technology evolves, job descriptions and their person specifications demand increased specialisation and a larger amount of technical knowledge and skills from university graduates (World Economic Forum, 2018). This creates a demand for students who enter higher education to be familiar with basic computer science concepts so that universities can start delivering more advanced and dedicated courses in their curriculum to achieve the industry demands. A common method to increase the number of high school students that pursue computing studies at university level is to increase their knowledge in the general field and provide them with examples of stimulating job opportunities that may arise from the computing discipline. Game development is a topic that excites young students due to its playful nature and has been widely used to get students involved and familiar with fundamental computing development activities. It has been well-examined and proved that developing games increases student motivation (Robertson & Howells, 2008; Repenning & Ioannidou, 2008; Seif El-Nasr et al., 2007; Martins et al., 2019) and interest and knowledge in the computing field (Denner, Werner, & Ortiz, 2012; Hayes & Games, 2008; Basawapatna, Koh, & Repenning, 2010; Werner, Denner, Bliesner, & Rex, 2009; Barcelos, Soto & Silveira, 2015). More recent studies highlight the benefits of games development in computing curriculum in schools (Renton, 2016; Kafai & Burke, 2016; Topalli and Cagiltay, 2018; Liu, 2018; Martins & Oliveria, 2018; Petri et al, 2019). However, despite the large volume of research in the area, there is still more to be discovered on what type of specialised computing principles and soft skills can high students learn during game development courses.

This paper presents a pilot study of delivering an annual game development competition to provide high school students with an opportunity to acquire knowledge and skills required in the software industry. Students formed teams of four within their schools and delivered their games (and accompanying reports documenting the development process) within a six months period. The study aimed to identify whether the students who participated in the study acquired understanding of fundamental software development skills. More specifically, the skills that were assessed are software engineering methods (prototyping, testing, and maintenance), design methods (using diagrams, reusability, interface design, content design) and team management techniques (role-playing, brainstorming). The study also examined if the exercise of the above skills correlated with good practice on game design, which was measured by a set of playability heuristics. The heuristic evaluation was performed by a group of game development experts that spend time playing testing the game and reading the submitted reports. The pilot study proves that the instruments utilised manage to capture important aspects of the software development process, the achievement of game development guidelines and real-life practical skills and provide an initial approach toward detecting correlations between them. The pilot study yielded stimulating results and proved that further investigation with a more solid intervention methodology may have potential of a positive impact.